

Recovery of Acids and Metal Salts from Pickling Liquors



Acid and Salt Recovery Now Cost-Effective for Smaller Manufacturers

Steel fabrication processes often use pickling (immersing steel in acid) to remove oxide layers from recently heated steel. Technology for recycling the sulfuric acid has been available for large installations for some time. The Green Technology Group, in collaboration with DOE's Inventions and Innovation Program, developed the Pickliq® process to make sulfuric acid recovery cost-effective for smaller facilities.

The Pickliq process combines diffusion dialysis, energy transfer, and low-temperature crystallization technologies to efficiently recover acids and metal salts. It has demonstrated significant gains in production capacity, quality control, and productivity by maintaining pickling tank acid and iron concentrations at preset levels. Bath uniformity and predictable performance raises output and minimizes rejects and rework. To manufacturers, these benefits are even more important than the simple cost savings from eliminating waste. Additional benefits include reduced demand for virgin acids and elimination of chemicals to neutralize waste acid, as well as energy and cost savings associated with acid transportation and disposal.

The Green Technology Group has recently improved the technology, and the new system called Pickliq Hydrochloric Acid Regeneration (PHAR®) will soon be commercially available.

Benefits

Productivity

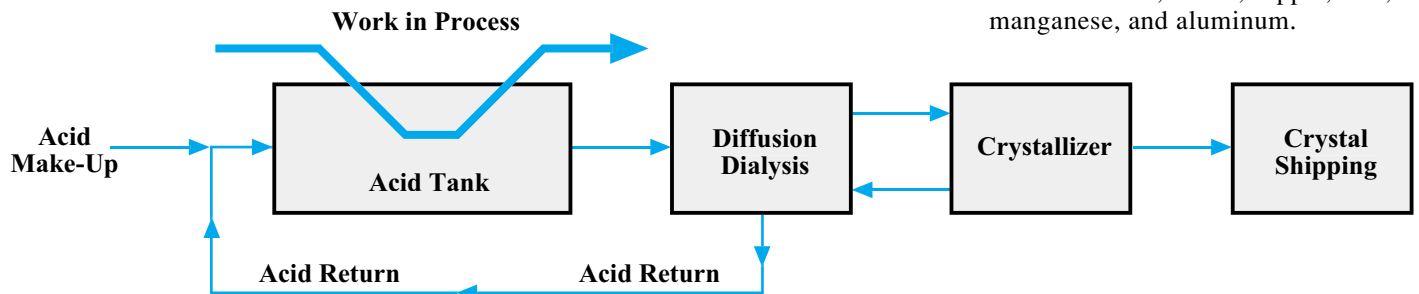
Significantly improves process uniformity and product quality, reduces downtime associated with acid revitalization, improves overall process effectiveness and throughput, and reduces rework. Optimal pickling bath acid concentrations are continuously maintained.

Profitability

Costs less than transporting and disposing of waste acid. Eliminates long-term liabilities of waste disposal. Generates a saleable by-product (metal salts) that can be used in a variety of applications. Results in rapid payback estimated at 6 months to 2 years.

Waste Reduction

Recycles acid for reuse, eliminating disposal of spent acid and neutralized sludge. Reduces the demand for virgin acids, conserving petroleum feedstock.



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Overview

- ◆ Developed by Green Technology Group
- ◆ First commercial unit installed in 1995
- ◆ 2 units operating in the United States

Energy Savings (Trillion Btu)

Cumulative through 2003	2003
0.010	0.001

Emissions Reductions (Thousand Tons, 2003)

Particulates	SO _x	NO _x	Carbon
0.0	0.0	0.0	0.026

Applications

To be used primarily in the primary metal industry but could be used in the metal finishing and circuit board industries for recovering acids and metal salts from etching and metal stripping

Capabilities

- ◆ Provides better process control and product quality.
- ◆ Maintains acid baths at optimum concentration.
- ◆ Permits continuous operation.
- ◆ Can recover hydrochloric, sulfuric, nitric, hydrofluoric, and other acids (including nonmineral acids).
- ◆ Recovers metal salts into a saleable by-product. Metals with recoverable salts include ferrous, nickel, copper, zinc, tin, manganese, and aluminum.